

Thesis
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**DEFINING WILD LAND IN SCOTLAND THROUGH G.I.S. BASED
WILDERNESS PERCEPTION MAPPING**

A thesis submitted to the University of Stirling
for the degree of Doctor of Philosophy

by

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Declaration

This thesis has been composed in its entirety by the candidate. Except where specifically acknowledged, the work described in this thesis has been conducted independently and has not been submitted for any other degree.

Signature of candidate: A. D. Adams

Date: 12th April 1999.

Dedication

For my Mother and Father.

Abstract

In a country such as Scotland, there is little land, if any, that has escaped the influence of humankind in one way or another. The degree of human influence varies along a continuum from, for example, the city centre office block, to a very remote mountain hillside. Despite the effects of human influence, the landscapes at the latter end of the continuum are still perceived by many as wild and are relatively untouched. Wild land is valued for both utilitarian and intrinsic reasons and provides a range of benefits. However, owing to the subjective nature of current wild land definitions, these values and benefits are rarely taken into account in current land use management and new developments. The aim of this study was to define in spatial terms the concept of wild land in Scotland using people's visual perceptions of the landscape. This was achieved through the development of a method to define objectively wild land by quantifying the wildness of a location based on the surrounding landscape attributes. The main objectives of the study were an assessment of the physical and perceptual characteristics of wild land, the examination of the current wildness of a range of Scottish areas which in turn enabled the stability of wild land perceptions over time to be evaluated in comparison with existing data.

The perceptual nature of wild land necessitates a multidisciplinary approach and requires a broad range of opinion to be consulted in its definition. The use of a photographic questionnaire enabled the views of those living nearby and visiting potential wild land areas to be gathered. The photographs represented the range of characteristic landscape attributes within the two study areas of the Cairngorms and Wester Ross, and were rated for their wildness. The extent of visible landscape attributes was quantified using a geographical information system (G.I.S.) and was used along with wildness ratings to develop and test predictive wildness models using multiple linear regression techniques.

Wildness models were then applied within each of the two study areas, producing maps of wild land that could then be used in decisions on future planning and conservation issues.

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List Of Abbreviations

AML	ARCINFO Macro Language
AONB	Area of Outstanding Natural Beauty
CC	Countryside Commission
CCS	Countryside Commission for Scotland
CPRE	Council for the Protection of Rural England
DEM	Digital Elevation Model
ESA	Environmentally Sensitive Area
GIS	Geographical Information System
GPS	Global Positioning System
IUCN	International Union for Conservation of Nature and Natural Resources
JMT	John Muir Trust
LAC	Limits of Acceptable Change
LCS88	Land Cover of Scotland 1988
MCE	Multiple Criteria Evaluation
MCofS	Mountaineering Council of Scotland
NNR	National Nature Reserve
NSA	National Scenic Area
NTS	National Trust for Scotland
NWPS	National Wilderness Preservation System
OS	Ordnance Survey
PAT	Point Attribute Table
RARE I/II	Roadless Area Review and Evaluation I and II
ROS	Recreation Opportunity Spectrum
RSPB	Royal Society for the Protection of Birds
SCU	Scottish Crofters Union
SLF	Scottish Landowners' Federation
SNH	Scottish Natural Heritage
SSSI	Site of Special Scientific Interest
SWCL	Scottish Wildlife and Countryside Link
WARS	Wilderness Attribute Rating System
WPS	Wilderness Purism Scale

Chapter 1

Introduction

The concept of wilderness is a product of the relationship between people and their environment and is a cultural construct of a perceptual nature. As a result of its perceptual character, the term conjures up an image that is both individualistic and subjective in nature. Present day expression of the wilderness concept varies between countries, from statutory protection of designated areas to debate about its relevance in the late 20th century. The concept is generally applied to areas that could be labelled as pristine, for example much of Antarctica. In contrast, the concept of wild land is distinguished from that of wilderness, and refers to wilderness in cultural landscape contexts.

Within the context of Scotland as a whole, both 'wild land' and 'wilderness' are words frequently used to describe many parts of the country. Indeed these are key selling points used in many of the tourist brochures encouraging people to visit the country. These strategies obviously tap into a common need to experience such landscapes, as shown in a recent survey of visitors from mainland Europe: the 'remote and wild countryside' was the third most important reason for visiting Scotland after 'mountain scenery' and 'coastline and islands' (Macpherson Research, 1996). Similar results from earlier studies of visitors to the River Spey area, indicated that the wildness of the area was one of the most attractive and enjoyable elements of their visit (Watson, 1988). Further evidence of the general public's use of the wild land concept was presented in a survey of public attitudes to moorland in which people described it as, amongst other things, 'wild' and 'wilderness' (Mackay, 1995). The notion of wild Scotland is also presented in publications such as the book *Highland Wilderness* (Prior & Linklater, 1993) and in television programmes such as *Wilderness Walks*, (BBC1, 1998) presented by Cameron McNeish, both featuring images of the uplands and mountains of Scotland.

Despite the way in which much of Scotland is marketed, either as Europe's last great wilderness, or the wild and beautiful land of the north, it is without a doubt a cultural landscape. People continue to be a part of the landscape and have been a major force in its change since the end of the last ice age approximately 10,000 years ago. As in other areas of Europe, this unique area is continually undergoing change. In some

areas of Scotland some developments such as the spread of conifer plantations in the Flow Country have had a deleterious effect on landscape quality and are not regarded as a sustainable land use (Hanley & Craig, 1991). In contrast, there are examples of more sustainable land uses such as the restoration of dry-stone dykes and the conservation management of semi-natural habitats in the Breadalbane Environmentally Sensitive Area (ESA) (Robinson, 1994).

The concept of wilderness has been used to good effect in other parts of the world for the management of areas primarily for conservation and recreation as in the USA, and in some cases to foster a sustainable development approach to the use of natural resources as in Zimbabwe. At the international level, calls have been repeatedly made to reinforce the definition of wilderness in terms of measurable objective criteria in order to enhance its conservation status (Eidsvik, 1988; Eidsvik, 1995); the same applies to wild land. The main issue for Scotland, which is clearly regarded as wild by many people, is how can the concept of wild land be applied to cultural landscapes? The thesis of this study is that wild land can be defined in a more objective manner than has previously been the case in this country, and that it can be given spatial expression to make it part of a sustainable conservation ethic for Scotland. The working definition of wild land is perceptual in nature and is heavily based on the influence of surrounding landscape features many of which are cultural in origin.

Many countries have defined wilderness in their own terms and for their own purposes, but all definitions have the common underlying aim to protect land by allowing processes of natural change to continue unhindered by the intervention of humankind where possible. Concern for the protection of wild land in Scotland was expressed in *The Mountain Areas of Scotland* report (Countryside Commission for Scotland, 1991) that recommended that the extent of such land should be evaluated. This report also suggested that a new National Planning Guideline should promote the incorporation of wild land values into planning and conservation policies. In light of these observations it is clear that there is a need to define the current concept of wild land in Scotland and to use this information to enhance current land management practices. In essence there is a need for a more objective definition of Scottish 'wild land' that could be used by all in discussing the future land use policy of such areas.

There are many ways of defining the concepts of wilderness and wild land, however one approach that has received little attention in Scotland is the perception of

the landscape by those who live near and those who visit such areas. Recent research has established that the meanings of the concept of wilderness both within North American culture and across ethnic, cultural and national boundaries remain poorly understood (Watson & Williams, 1995). The same can be said for Scotland and this project is concerned with identifying the relationship between the perception of wild land and the different groups of people who interact with extensively managed Scottish landscapes. A perceptual approach allows the individual to decide what is and is not wild. With reference to disputes between Highland communities and conservationists, for example the Lingerbay super quarry proposal (Mackenzie, 1998), it is likely that their perceptions of wild land and also those of recreational visitors are different. Involving the local communities within areas subject to landscape designations in policy planning and studying their perceptions of the area and its management was suggested as a way forward in a study of tranquil areas in the English and Welsh National Parks (Caffyn & Prosser, 1998). In a perceptually based study, it is important to take into account the views of all the parties concerned in order to obtain a broad cross section of opinion.

Increasingly there is a move to integrate the physical or tangible elements of the land with a consideration for the more intangible components when planning the future land uses of the Scottish Highlands. Intangibles such as the value of wild land, solitude and landscape aesthetics are becoming important factors that need to be taken into account by land managers. There is an increasing interest in the actions of land managers by people who value the landscape in which they work. The application of tools such as a geographical information system (GIS) and image processing techniques to the study of these landscape elements is allowing research to be undertaken at an unprecedented level of detail and speed for example the remoteness mapping work of Fritz and Carver (1998). Justification for the use of intangibles such as aesthetic preference in land use decisions comes from the premise that the visual impacts of development are usually the most immediate and direct of any caused by a new project.

The methodological approach used to assess the character and spatial expression of perceived wild land is multidisciplinary out of necessity. The techniques used, from the fields of landscape perception and management research are brought together for the purposes of improving understanding of the wild land concept in Scotland. This study will add to the work of Aitken (1977) on wilderness areas in Scotland, who suggested that research be undertaken into the views of other subject groups, apart from

recreational visitors, such as land managers in upland areas. In addition, calls were made for a perceptual mapping survey to bring the knowledge of peoples perceptions of such areas up to date both in 1977 (Aitken, 1977) and again in 1995 (Aitken *et al.*, 1995). Similar suggestions were made in the USA in order to increase understanding of the variations in perceptions and influences on the variability (Stankey & Lucas, 1984). Some of these suggestions have helped to shape the nature of the current study. The next chapter develops the objectives and hypotheses of the thesis by reviewing the concepts of wilderness and wild land focusing on their adaptability for use in Scotland.

Chapter 2

The Concept Of Wild Land And Wilderness

2.1 Introduction

This chapter presents an analysis and review of the literature covering the background to the concept of wild land. An examination of how the wild land concept originated from the wilderness idea is presented, as are the changes that have taken place over the last century in the reasoning behind the decision to set aside some areas of a country's terrestrial, and more recently, marine environment with a certain degree of protection. The reasons for protecting some wilderness areas in terms of the benefits with which they are associated, and the values people attach to them are presented. How these values have been addressed by governments worldwide in the form of designated wilderness areas is then reviewed. The chapter looks at contributions in defining the concept of wild land and evaluates these definitions in terms of their applicability to Scotland and details any theoretical or empirical weaknesses that exist in the literature. The problems associated with the spatial expression of differences in wild land perception between diverse groups of people are also discussed. The need to define 'wild land' is developed in terms relating specifically to the Scottish landscape which acknowledges the long history of human interaction with the land.

2.2 Wild Land Or Wilderness?

The terminology of wild land in the Scottish context is important. There is no wilderness in Scotland, if the word is understood to describe an area untouched by humankind in a pristine natural state. However this is a somewhat simplistic interpretation of the word 'wilderness' although it will suffice for the purposes of the line of argument of the thesis. To the people who live in the Highlands of Scotland the landscape represents an emptied land (Aitken *et al.*, 1995), but one that is perceived more often than not by the urban dweller as an empty wilderness. The degree of human influence on the Scottish landscape has left little untouched, and yet in many places there still exists a sense of wildness. It is these areas that are referred to as 'wild land', an idea which owes its origins to the concept of wilderness.

Fenton (1996) has classified North American wilderness as 'primary wilderness':

“an area with the full range of its indigenous flora and fauna, large in area and possessing no people or artefacts”. (p. 17).

The next level of classification, which is applicable to some areas of Scotland, refers to ‘secondary wilderness’:

“an area of semi-natural vegetation where wild animals predominate over domestic stock, medium to large in area and possessing few people or artefacts” (Fenton, 1996, p. 17).

Although Fenton’s definition is applicable to Scotland, any label containing the word ‘wilderness’ implies ‘natural’ or ‘pristine’, and as already mentioned is not applicable to Scotland. As an alternative, the term ‘wild land’ can be used in place of ‘secondary wilderness’ as suggested by Aitken *et al.* (1995) and this practice is followed here. The word ‘wilderness’ is used in the case where referenced work explicitly uses this term, as is predominantly the case in work from the USA, Canada, Australia and New Zealand, all containing areas of primary wilderness. When the narrative refers to the Scottish context, the term ‘wild land’ will be used.

2.3 Historical Development Of The Concept

Several reviews of the historical development of the wilderness concept have been written (Aitken, 1977; Stankey, 1989; Oelschlaeger, 1991; Short, 1991), but the majority of them refer back to the first major work on this topic by Nash (1967), *Wilderness and the American Mind*. A broad summary of the historical development of the concept of wilderness worldwide is presented here.

Within hunting and gathering societies there is no concept of wilderness (Short, 1991), and this has been reaffirmed time and time again by present day scholars in North America (Lyons, 1988) and Australia (Franks, 1995). The origins of the wilderness concept lie in the first agricultural revolution about 10,000 years ago (Short, 1991). This period was the start of the domination of nature by humankind and the psychological separation of civilised and settled land from the rest of the landscape. Wilderness was a place to fear before the 18th century when it began to be a place to revere (Nash, 1967). From early accounts until the eighteenth century, the land beyond the village was viewed in a negative sense and feared, as the place of superstitious creatures (Aitken, 1977). In the later part of this period, ideas were also influenced by the Bible: this contains many references to wilderness and the human domination of nature, that are mainly negative and that greatly influenced Judaeo-Christian thought on the relationship between man and nature (Aitken, 1977). These views remained dominant in western Europe well into

